

# Early blight in South Africa

## What do growers know?



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Early blight, causal agent *Alternaria solani*, is one of the major foliar diseases of potatoes and causes premature defoliation of potato plants almost everywhere they are grown. The purpose of this study was to determine the impact of early blight on the South African potato industry and to evaluate grower knowledge and control practices of the disease



A survey was conducted from May 2001 – July 2002 among potato growers in South Africa using an informally structured questionnaire. A total of 127 questionnaires were collected from Limpopo, Mpumalanga, Northern Cape, Western Free State, Eastern Free State, KwaZulu-Natal, Sandveld, Ceres, Eastern Cape and North-Eastern Cape.

Questionnaires were not collected from North-West, Gauteng, South-Western Cape and Southern Cape, due to the low numbers of

growers in these regions and difficulties in reaching them. Because only one response was received from Ceres, this was left out of all calculations. The two responses from Mpumalanga were combined with those from Limpopo, which has similar climatic conditions.

### Crop production

Sixty percent of the respondents irrigate their potato crops; of these, 31% do so twice a week, 33% once a week and the remaining

36% follow other irrigation schedules. Other irrigation schedules that were mentioned were: daily; 2 – 3 times per week; every six days; when necessary; only in the early part of the season; four times per season and according to the Soil Water Balance model. Ninety-seven percent of respondents use certified seed.

### Control practices

The predominant method for control of early blight in all regions was through the

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use of registered fungicides. The most widely used (65% of respondents) fungicides were those with mancozeb as active ingredient. The second most widely used (53%) active ingredient was chlorothalonil. Tebuconazole, difenoconazole, azoxystrobin and cymoxanil/famoxadone were used by 25%, 23%, 21% and 18% of respondents, respectively. Active ingredients used by between 5% and 10% of respondents were cymoxanil/maneb, captab, mancozeb/zinc oxide and various copper compounds. Less than 5% of respondents used fungicides with the following active ingredients: mancozeb/metaxyl, propineb, bupirimate/hexaconazole, fenitrothion, flutriafol, cyproconazole, propamocarb hydrochloride, procymidone, cymoxanil/propineb, fenitrothion acetate/maneb, dimethomorph/mancozeb and phosphorous acid equivalents. (These percentages do not tally to 100, as many respondents listed more than one active ingredient.)

Contact fungicides are used by more respondents than are systemics, which are more expensive and hold greater risk for the development of resistance in the fungus. A protectant fungicide spray programme from early in the growing season until vine kill, as used by the majority of respondents, has been shown by previous researchers to be the most effective method to control early blight. None of the respondents used biological control agents.

Fungicide spraying for the control of early blight commences at flowering for 49% of the respondents, at symptom appearance for 19%. The remaining 32% commenced spraying at other

times, such as: six weeks after planting; one month before flowering; at emergence; one, two, three or four weeks after emergence; 30 – 50 days after emergence; or at row close. Once spraying has commenced, 86% of respondents spray every 7 – 10 days, 10% apply fungicides at other intervals, and 4% of the respondents apply fungicides according to a model. In response to a question about whether they would be willing to use an early blight decision support system (DSS), only 8% of respondents answered no, 7% were unsure, while 85% of respondents indicated that they would be willing to use one. Of the respondents who answered yes, 87% also indicated that they believe that more research is necessary on early blight in South Africa. This indicates that there is a need and support for the establishment of an early blight DSS in South Africa.

#### Potato cultivars planted and perceived susceptibility thereof

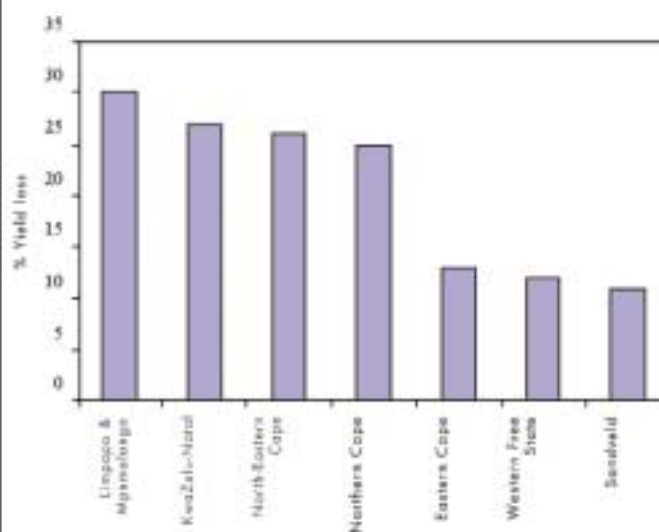
Most respondents plant between one and four cultivars. The most popular potato cultivar in all regions is BP1, which is planted by 74% of respondents, with more than 83% of these respondents planting in excess of 11 ha to BP1. Up-to-Date and Mondial are also popular cultivars, planted by 28% and 23% of respondents, respectively. Up-to-Date is planted by more than half of the respondents in both the Eastern Cape and Eastern Free State. The cultivars Buffelspoort, Vanderplank, Hertha and Mnanidi are each planted by between 6 and 11% of respondents. The remaining cultivars listed, namely Hoëvelder, Fianna,

Ropedi, Lady Rosetta, Ronn, Liseta, Astrid, Imola, Sandvelder, Darius, Inova and Fabula, are planted by less than 3% of respondents.

BP1 was rated as moderately susceptible by 36% of respondents. Up-to-date was rated as very susceptible to early blight by 41% of respondents and as susceptible by 21% of

blight, but rather on physiological properties and high yield potential. In contradiction, many growers still requested the development of cultivars resistant or tolerant to early blight.

A few discrepancies were observed between the perceived susceptibility of certain cultivars and susceptibility as measured



respondents. More than half of the growers rated the slightly less popular cultivar, Vanderplank, as resistant or moderately resistant to early blight. In the case of Mnanidi, equal proportions of growers rated it as resistant to early blight as did highly susceptible. Some of the cultivars rated as moderately resistant to early blight were Hoëvelder, Mondial and Fianna.

It is interesting to note that although both BP1 and Up-to-Date were rated by the majority of growers as susceptible, and that cultivar trials have also shown them to be susceptible to early blight and highly susceptible to late blight, both are still popular choices. It would appear that the selection of these cultivars by growers is not based on the knowledge of susceptibility to early or late

in cultivar trials. The susceptibility of a cultivar to diseases may be influenced by prevailing climatic conditions, which could explain these differences. In addition, the fact that most growers plant and are familiar with fewer than four cultivars, could bias their perception of the susceptibility of these cultivars.

#### Estimated economic losses

Estimates of economic loss due to early blight ranged from 1% to 60%, with the average being 20% (Fig. 1). Only 66% of respondents answered this question. The differences in estimated yield losses between regions could be due to control practices, cultivars planted, false perceptions about the disease, or, most likely, differing climatic conditions. It

has also previously been observed that in many regions where late blight is a major problem, management strategies are focused primarily on the control thereof, using systemic fungicides for this purpose. In these situations, early blight control is neglected and losses due to the disease may be higher than they would be if an integrated disease management programme, using contact fungicides, were to be used. In addition, the fact that many respondents were unsure of the economic losses caused by early blight highlights the need for a comprehensive economic impact study of early blight, so that resources for effective disease management can be prioritised.

#### Areas of research requested by growers

In answer to a question dealing with the need to do research on early blight, 84% of respondents agreed that research is necessary, 13% answered no and 3% did not answer. Answers from the second research-orientated question, which was open-ended to determine what research the respondents would like in the area of early blight, were summarised into 13 main categories. These are listed below in order of importance:

- Forecasting and timing of fungicide applications
- Development of more effective and cheaper fungicides with longer residual action
- Breeding of resistant cultivars
- Economics of control of early blight and yield loss due to the disease
- Overwintering of the fungus, transfer from one season to the next and



the possibility of transfer by seed tubers

- Environmental conditions favourable for the development of early blight
- Development of resistance to fungicides and prevention thereof
- Early detection of disease (before appearance of symptoms)
- Effect of cultural practices (including time of planting, situation of land, time of irrigation, and soil fertility and pH) on incidence of early blight
- Effect of crop health (stress conditions) on onset of early blight
- Possibility of biological control
- Role of insects (especially leaf miners) in development of early blight
- Effects of chemical mixtures

#### General comments of growers

The comments from an open-ended question about the disease were summarised into ten main groups, listed below in order of importance:

- Early blight can be effectively controlled with fungicides and is not a serious problem
- Early blight is a very

important disease that can cause large economic losses and is underestimated

- Early blight occurs mainly when plants are stressed, due to nutrient deficiencies, age or insect damage (again, leaf miner was specifically mentioned)
- Late blight is more important than early blight
- Control of early blight is expensive
- Fungicides are not very effective in controlling early blight
- Climate plays an important role in development of the disease
- There is not enough information available on the disease
- Involve growers in research
- Education of field workers in disease control and identification is important

Research in South Africa should focus on the development of resistant or tolerant cultivars; the development of more effective and cheaper fungicides or other control measures; overwintering of the fungus; the possibility of seed transfer and the role of insects, especially leaf miners, in early blight development and spread.

Other areas that will become more important as the global community moves away from the excessive use of fungicides, are the development of possible biological control measures, integrated pest management systems and accurate DSS.

The requests from many respondents for research or more information on the climatic conditions and life cycle of the pathogen indicate that, although there is a substantial amount of information available to the scientific community, many growers are not properly informed about the conditions required for development and spread of the disease. This emphasises the need for more growers' days or workshops, as requested by a few respondents in the comments on the disease.

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